

CIA/OER/IM 71-35 INDIA: GOVERNMENT POLICY
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**DIRECTORATE OF
INTELLIGENCE**

Intelligence Memorandum

India: Government Policy And Petroleum Supply Problems

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CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence
March 1971

INTELLIGENCE MEMORANDUM

India: Government Policy
And Petroleum Supply Problems

Introduction

Since independence in 1947, New Delhi has sought to broaden the government's control over all sectors of the modern economy. For the petroleum industry this has meant total public ownership of all phases of the search for crude oil and an insistence that the government achieve the dominant role in refining as soon as possible. India has also followed a general policy of import substitution. There are basic conflicts among these policy goals, and the successful implementation of one has often meant the failure of another. This memorandum examines the impact of these policies on trends in crude oil production and refining and on the oil trade and assesses the outlook for India's petroleum balance for the next few years. The principal problems of India's petroleum industry are treated in some detail in the Appendix.

The Nature of the Petroleum Industry

1. In India, as in most developing countries, the demand for petroleum has increased rapidly -- an average of 10% annually for the past two decades. The demand for fuel by industry and transportation and for kerosine by an expanding population has

Note: This memorandum was prepared by the Office of Economic Research and coordinated within the Directorate of Intelligence.

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caused consumption to increase from about 60,000 barrels per day (b/d) in 1950 to nearly 350,000 b/d in 1969 (see Table 1). Even so, Indian petroleum consumption per capita still remains among the world's lowest. In part this reflects the government's policy of favoring coal over oil as an energy source. Demand has been restricted by New Delhi's maintenance of high retail prices for petroleum products.

Table 1

India: Petroleum
Products -- Consumption,
Production, and Trade

<u>Year</u>	<u>Domestic Consumption a/</u>	<u>Domestic Production</u>	<u>Imports</u>	<u>Exports</u>
1950	58.8	4.2	59.6	N.A.
1955	96.4	60.8	41.4	N.A.
1960	155.5	114.9	60.6	4.5
1965	245.6	182.3	57.4	6.8
1966	259.4	225.7	44.0	14.5
1967	281.3	269.0	19.0	21.1
1968	316.6	298.5	18.7	11.2
1969	347.2	322.8	23.1	17.5

a. Including refinery fuels and bunkers.

2. From a mere 4,000 b/d in 1950, India's refinery output increased rapidly to more than 320,000 b/d in 1969. While production nearly met local needs, the pattern of refinery output was not wholly satisfactory. Thus about 5% of production was exported and about an equal volume imported. Imports worth \$55 million in 1969 came mostly from Communist countries and consisted mainly of kerosine, furnace oil, and lubricants, while exports were mostly naphtha and gasoline (see Appendix Table A-1).

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3. In 1950, India had only one small refinery. It now has eight modern installations in addition to the original small British-owned refinery in Assam. Three private foreign-owned refineries (ESSO, Burmah Shell, and Caltex) with a present capacity of about 200,000 b/d were built during the 1950s (see Table 2). These were sited in major ports and operated with imported crude (see the map, Figure 1). During the first half of the 1960s, three Indian government-owned refineries, two built near the oil-producing areas in eastern and western India and the other near the Ganges River in densely populated Bihar State, increased the country's refining capacity by 70%. And in the last half of the 1960s, two joint public-private refineries were added in port cities of southern India, bringing refinery capacity to today's 450,000 b/d.

4. After stagnating for years at less than 10,000 b/d, India's crude oil production began to increase sharply in 1962 and reached 135,000 b/d in 1969 (see Table 3). Crude oil is now produced about equally in Assam and Gujarat, the only producing states (see Table 4). The rise in output during the 1960s resulted from opening new fields in Assam, where oil had been produced for more than 80 years, and the discovery of oil in the Cambay basin in Gujarat State during the late 1950s. Domestic crude oil production is still far below national requirements, however, and imports have increased in volume since 1950, although they have declined as a share of total supply from about 90% in 1955-60 to about 60% in 1969.

5. Production of crude oil from existing fields is beginning to decline, however, and new fields are not being found. Proved reserves, now less than 1 billion barrels, are decreasing despite stepped-up exploration efforts. Proved reserves are equivalent to only 3 or 4 years of India's expected oil consumption.

The Role of Government

6. Indian government policy favors the public ownership and development of all phases of the fuel and power industries. This policy, first stated in the 1948 Industrial Policy Resolution,

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Table 2

India: Present Oil Refinery Capacity
and Throughput and Planned Capacity in 1973

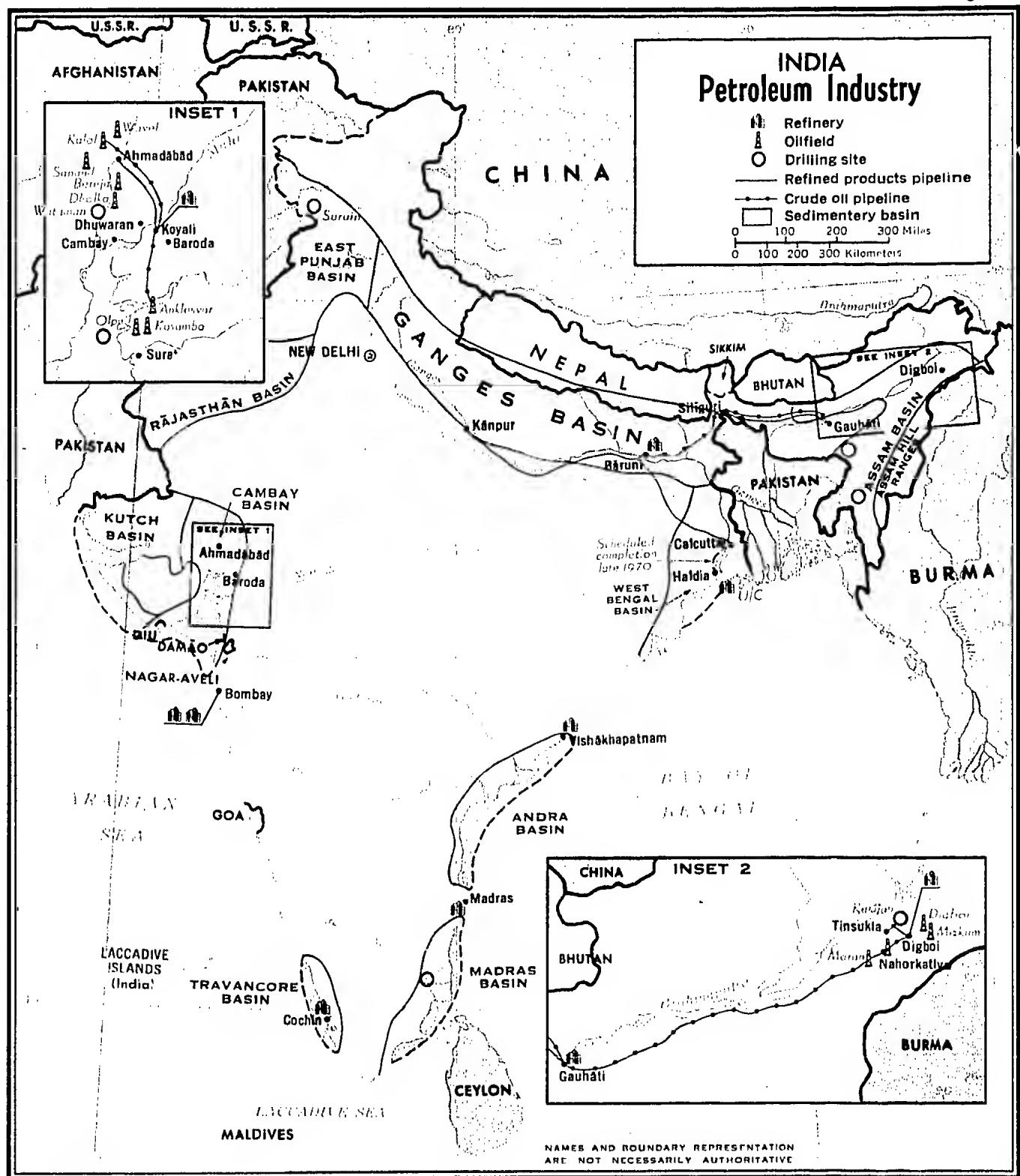
Name or Location	Year Operation Began	Present Throughput Capacity (Thousand Barrels per Day)	Throughput in 1969 (Thousand Barrels per Day)	Planned Capacity by 1973 (Thousand Barrels per Day)
<u>Private</u>				
Assam Oil Company at Digboi	1900	10.4	10.7	10
ESSO at Bombay	1954	70.0	49.2	70
Burmah Shell at Bombay	1955	96.0	77.2	96
Caltex at Visakhapatnam	1957	30.0	26.3	30
Total private		<u>206.4</u>	<u>161.4</u>	<u>206</u>
<u>Public</u>				
Gauhati (or Nanmati) in Assam (built with Romanian help)	1962	15.0	16.0	15
Barauni in Bihar (built with Soviet help)	1964	60.0	42.2	60
Koyali in Gujarat (built with Soviet help)	1965	66.0	72.7	90
Haldia (under construction with French and Romanian help)	Possibly by 1973	--	--	50
Total public		<u>141.0</u>	<u>130.9</u>	<u>215</u>
<u>Public-Private</u>				
Cochin in Kerala a/	1966	53.5	50.0	70
Madras b/	1969	50.0	17.5	50
Total public-private		<u>103.5</u>	<u>67.5</u>	<u>120</u>
Total all India		<u>450.9</u>	<u>359.8</u>	<u>541</u>

a. Ownership: government of India, 52.4%; Phillips Petroleum Co., 26.4%; Duncan Brothers & Co., Ltd., 2%; other Indian, 19.2%.

b. Ownership: government of India, 74%; American International Oil Company, 13%; and National Iranian Oil Company, 13%.

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Figure 1



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Table 3
India: Production and Imports
of Crude Oil

<u>Year</u>	<u>Thousand Barrels per Day</u>		
	<u>Total Supply</u>	<u>Production</u>	<u>Imports</u>
1950	5.2	5.2	0
1955	67.4	6.9	60.5
1960	123.6	9.1	114.5
1965	196.5	60.3	136.2
1966	242.5	92.9	149.6
1967	291.9	113.3	178.6
1968	332.6	119.1	213.5
1969	350.8	135.0	215.8

Table 4
India: Production of Crude Oil, by Area

<u>Year</u>	<u>Thousand Barrels per Day</u>		
	<u>Assam</u>	<u>Gujarat</u>	<u>Total</u>
1950	5.2	0	5.2
1955	6.9	0	6.9
1960	9.1	0	9.1
1965	37.0	23.3	60.3
1969	65.7	69.3	135.0

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allows exceptions when, in the national interest, the state finds it necessary to obtain the cooperation of private enterprise. This policy, influenced in varying degrees by forces of nationalism, socialism, and economic self-interest, has not been constant nor always consistent.

7. From 1948 to 1955, New Delhi encouraged foreign private investment in the industry. This policy reflected an urgent need for industrial fuels, the lack of domestic capital and technical ability to build refineries or search for oil, and the desire to establish what was considered a strategic industry. The government temporarily abandoned its demand for public ownership and control and persuaded Stanvac (now ESSO), Burmah Shell, and Caltex, which then were only distributing oil in the country, to build local refineries. The companies invested about \$95 million and signed long-term agreements giving them the right to import crude oil of their own choice, providing full ownership and control, and guaranteeing against nationalization for 25 years. Only a limited amount of preferred stock had to be offered to Indian nationals.

The Change in 1956

8. In 1956, policy again shifted and the government took steps to expand the public sector. Prompted by the success of the First Five-Year Plan, which improved the country's foreign exchange position, and by a public outcry against the foreign private refinery agreements and high retail petroleum prices, New Delhi turned increasingly to the Communist countries for financial and technical assistance. The USSR and Romania responded with \$55 million and \$10 million, respectively, for refinery construction alone. New Delhi sharply increased its own investment to build Communist-aided public sector refineries and to explore for oil. The government also took complete responsibility for exploring and producing oil and natural gas; insisted on participating with the British-owned Burmah Oil Company in a joint venture called Oil India, Ltd., to explore for and produce oil in Assam; and established a marketing company which eventually began managing the public sector refineries, pipelines, and distribution system.

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The 1960s -- The Refining Sector

9. By 1960, severe foreign exchange shortages had developed -- during the 1950s reserves fell some \$1.3 billion to \$670 million. This plus the fact that the Communist-assisted refineries lagged far behind construction schedules caused the government to allow foreign private refineries to expand capacity by nearly 50%. The demand for crude oil imports had also increased rapidly, and in 1960 the USSR offered India large quantities of low-priced crude oil on a barter basis and refined products at prices substantially below the private refinery prices (for details, see the Appendix, Part I). The private companies refused either to process Soviet crude oil or to distribute Soviet products. The government, however, did arrange to import and distribute some Soviet kerosine and diesel fuel on its own.

10. The government's share of refinery capacity expanded rapidly as the public refineries came into production. The first three such refineries, built with Soviet and Romanian help, took about twice as long to complete as similar plants built by Western firms. The first was completed in 1962, the second in 1964, and the third in 1965. Once completed and once initial operational problems were overcome, however, they sharply increased the country's refinery output (see Table A-2). These public refineries, managed by the Indian Oil Corporation (IOC), now account for more than one-half of all products refined in India. The IOC also distributes the public refinery output as well as imported petroleum products. The IOC is considered the most efficiently run and profitable public corporation in India.

11. Since 1964 the government has restricted private refinery operations while continuing to expand the public sector. New Delhi became increasingly dissatisfied over the high prices the private companies paid for imported crude oil and their reluctance to sell equity stock to Indians. As a result, the government has limited private refinery expansion, cut the crude oil supply in 1969 to about 160,000 b/d (about 45,000 less than the capacity of the private refineries), prohibited new private distribution outlets that would compete

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with public outlets, increased taxes, and largely stopped private companies from importing products.

12. The government's current petroleum policy, however, implies reduced reliance on Soviet assistance.* New Delhi contracted for two joint public-private refineries each with a capacity of 50,000 b/d to be built and managed by Western oil companies. As the majority stock holder the government considers these refineries part of the public sector and to be consistent with its basic oil policies. New Delhi also tried to get a similar arrangement for building the Haldia refinery, but finally accepted a \$10 million Romanian and a \$20 million French government loan and technical help. .

The Search for Oil

13. New Delhi's policy line with respect to petroleum exploration has been somewhat more constant than that for the refinery sector and consists basically of joint operations and "go-it-alone" with foreign aid and technical help. It was to further this policy that the government formed Oil India, Ltd. and entered into a 50-50 partnership in 1959 with the British-owned Burmah Oil Company, which operated in Assam long before Independence. The only other joint project was a 75-25 cost-sharing deal with Stanvac in the 1950s. The joint company's effort to find oil in West Bengal failed, however. Otherwise, the government has explored and developed oil resources on its own with Soviet -- and some Romanian -- guidance and aid. The USSR provided a total of \$205 million and Romania \$1 million in credits beginning in 1956 for equipment and technical assistance.

* India has moved away from almost exclusive reliance on Soviet technical help for both petroleum refining and exploration. Soviet oil refining is technologically backward in terms of the quality of individual products, product mix, depth of refining and complexity of refining processes. Likewise in exploration Soviet technology is outdated and equipment unsuited for use in India's geological structures (see the Appendix, Part II).

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India is currently drawing on the second \$100 million of this credit.

14. India has failed to produce enough domestic crude oil to meet the country's needs. Refined domestic crude oil accounts for only about 35% of all petroleum products consumed in India. The remaining requirements are met from imported crude oil and products. Moreover, the situation has been deteriorating since 1967, with total petroleum consumption growing faster than domestic crude oil production (see Figure 2).

15. Both the search for oil and the developing of newly discovered fields have been poorly handled. Extensive surveys conducted during 1947-53 by the Geological Survey of India revealed possible oil-bearing structures in 25% of the country. But by 1969, detailed mapping had been completed for less than 5% of this area. After more than 20 years, India still has little knowledge of its possible petroleum resources. In the only new field discovered, Ankleshwar in Gujarat, production has lagged far behind expectations. Insufficient funds, poor equipment, and lack of adequate technical guidance and knowhow have been major problems.

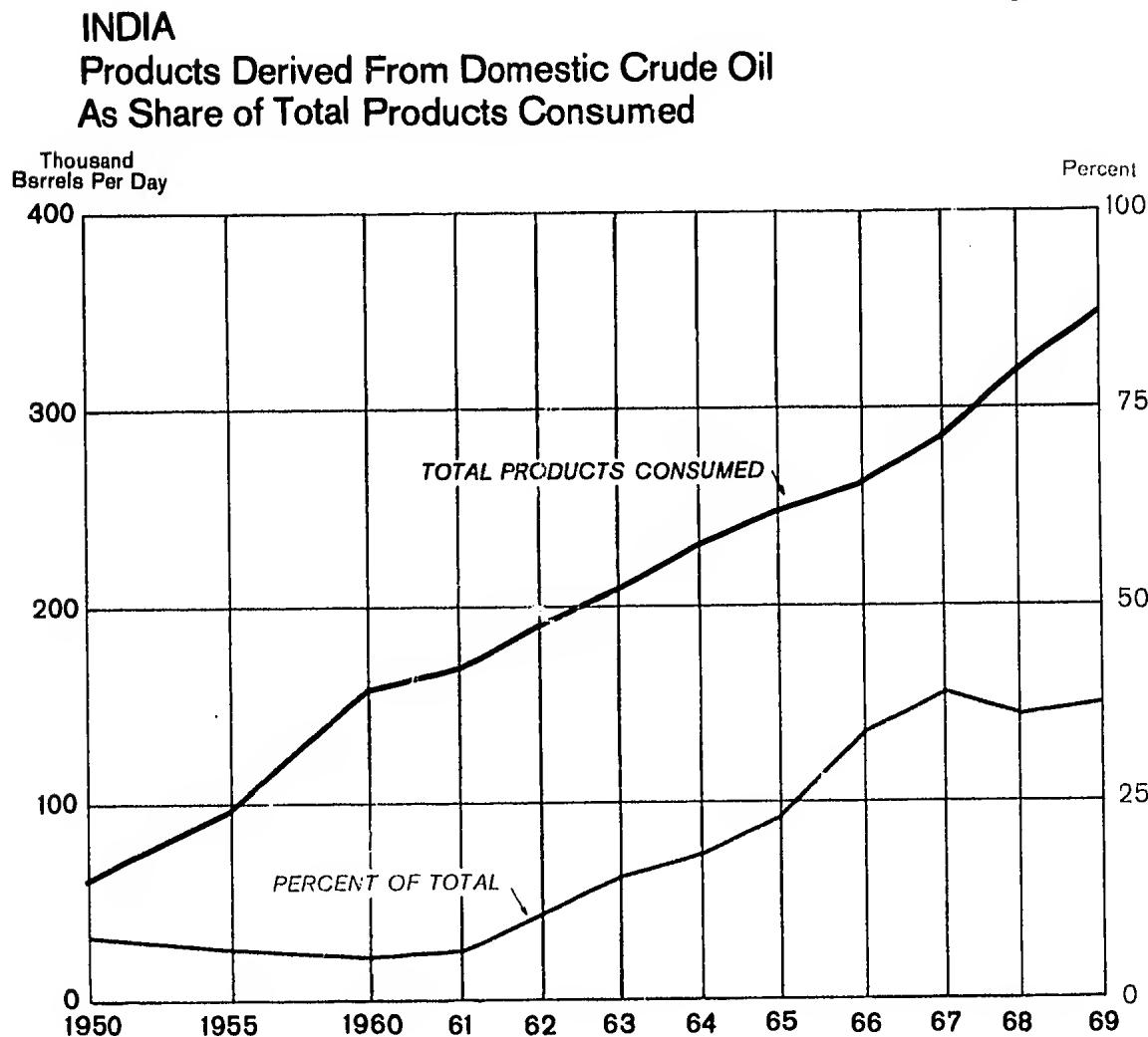
16. India's dependence on Soviet equipment and technical aid has slowed exploration and drilling. Soviet exploration techniques are at least ten years behind those of the West, and Soviet drilling equipment is poorly suited to Indian geological conditions. Drilling has been slow and subject to frequent breakdowns. The Soviets do not have the technology for deep off-shore drilling, and even for shallow off-shore drilling their technology is backward as indicated below (for details, see the Appendix, Part III).

Balance-of-Payments Effects

17. Even though India still imports large quantities of crude oil, the government has been successful in reducing the unit cost of this oil. A comparison with Japan, a country which has had notable success in bargaining for a much larger volume of imports than India, indicates that by 1969 India's percentage reduction in cost was equal to that of Japan (see Figure 3). While part of the decrease achieved by both countries was due

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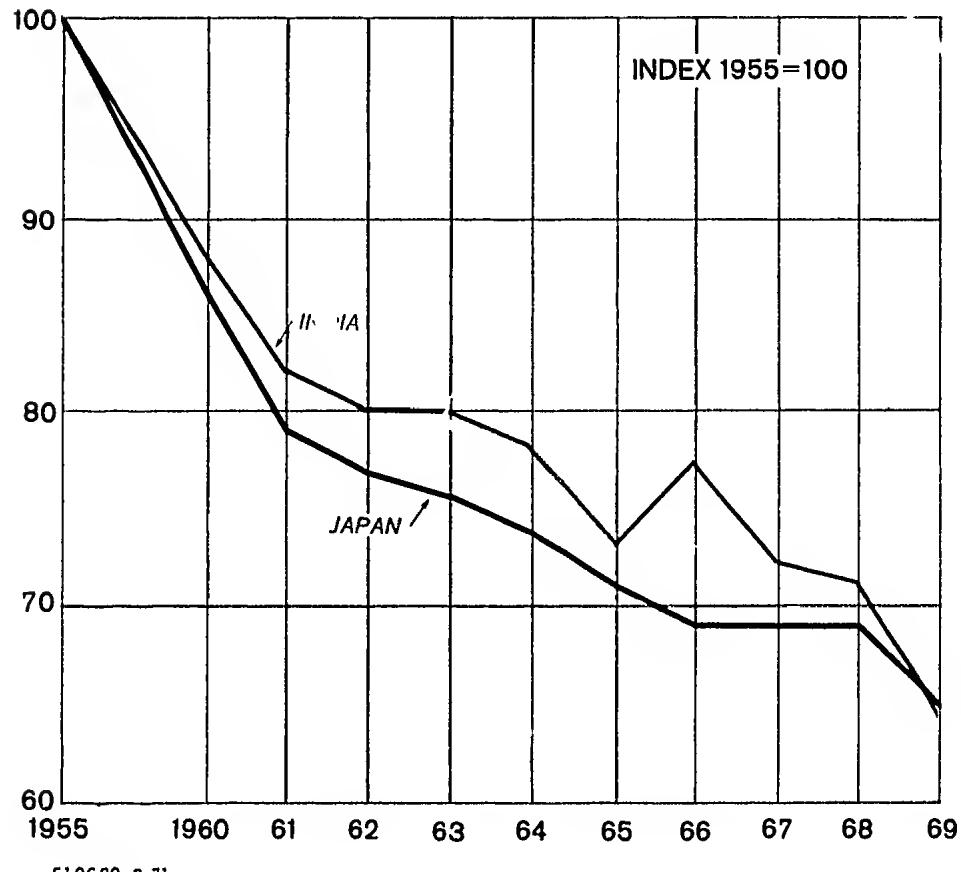
Figure 2



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Figure 3

INDIA and JAPAN
Comparative Index of Cost Per Barrel
of Crude Oil Imports



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to a general world price decline, Indian pressure on the international companies in the 1960s helped bring about further reductions. For example, without the 10% decline in prices of imported crude oil between 1968 and 1969, India would have paid about \$12 million, or an average of 15 cents per barrel, more than it did.

18. While the government's import substitution policy has been successful for refined products, the total value of petroleum imports has increased during the past five years. The problem is that while product imports have declined, crude oil imports have increased sharply since 1965. The value of petroleum imports reached \$185 million in fiscal year 1969-70, with crude oil accounting for about 75% of the total. While increasing petroleum imports have added substantially to the country's chronic trade deficits, the situation could have been much worse. If the 1965 volume of refined oil imports had continued, the total petroleum import bill in 1969 would have been nearly 50% higher. The domestic refineries now meet more than 90% of domestic demand compared with about 75% in 1960. The major share of the improvement has been made since 1965 (see Table 1). Moreover, tight government controls over the private refineries have also sharply reduced repatriation of private refinery profits. ESSO, for example, reports that net returns on investment declined from 11.6% in 1955 to 3.6% in 1969. From the standpoint of balance of payments, reduced profit repatriation has been a benefit but at the same time new private petroleum companies have been discouraged from entering the country and badly needed private foreign investment inflows have probably declined.

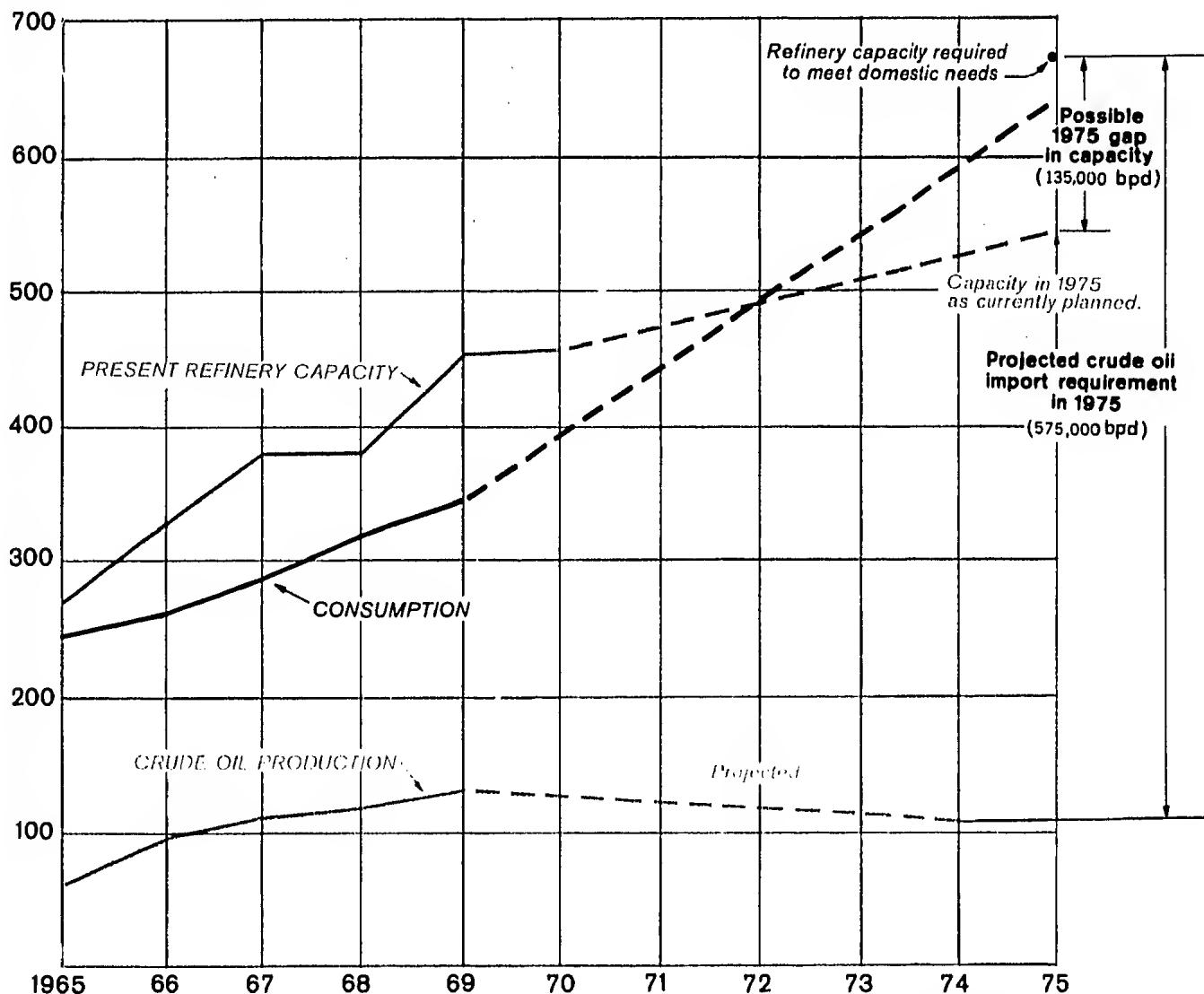
Prospects

19. Without some bending of the official petroleum policy and considerable acceleration in crude oil production and refinery expansion, India's petroleum imports will increase sharply during the next five years (see Figure 4). We estimate that petroleum consumption will increase an average of 10.5% annually, with as much as 65% of the demand being supplied by imported crude oil and possibly another 20% imported as products with a

Figure 4

INDIA**Petroleum Requirements in 1975 Compared With
Present Prospects for Meeting the Requirements**

In Thousand Barrels Per Day



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much higher unit price. At current prices this volume of imports would raise India's petroleum import bill to at least \$400 million in 1975, compared with \$185 million in fiscal year 1969-70.

20. With present plans and policies, India's refinery capacity will fall about 135,000 b/d short of domestic requirements in 1975. India will need to expand capacity about 50% -- to some 675,000 b/d -- in order to reach self-sufficiency. But only an increase of some 90,000 b/d by 1975 is planned for the public refineries, including the Haldia refinery now under construction. Two other refineries are in the talking stage -- one for the New Delhi area and one in Assam. Unless new reserves are found in these areas, both would require long pipelines to supply crude oil. And judging from past rates of refinery and pipeline construction, India will not likely have these in operation by 1975.

21. This refinery shortfall could be overcome to a considerable extent were existing private refineries allowed to expand (as they have requested to do many times), but present policy restricting refinery expansion to the public sector would have to be changed. On the other hand, the private companies have initiated discussions to sell the government majority ownership in the refineries, as they see no future for them in India under the present arrangements. If this comes about, these refineries could be expanded without a policy change -- that is, they would then be considered in the public sector.

22. The gap between domestic crude oil production and requirements is also growing. We estimate crude oil imports will reach 575,000 b/d in 1975 -- over two and one-half times the 1969 level -- unless new domestic fields are found and brought into production. We doubt that the recently discovered and still unproven fields in Gujarat will improve prospects much. Substantial new finds, possibly in the shallow offshore area in the Gulf of Cambay now being explored, would contribute measurably to increased production by 1975. Hopes also are very high that, in the longer run, deep-water offshore drilling in the Bombay High will reveal substantial reserves. But drilling

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has already been delayed five years since the area was first revealed by a joint Indian-Soviet off-shore survey. Even if the drilling confirms new reserves, production is unlikely before 1975. These long delays appear to have moved New Delhi away from almost exclusive reliance on the USSR to more efficient Western help. India is currently negotiating for Japanese equipment and US expertise for deep-water drilling.

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During the late 1950s, India became increasingly dissatisfied with both the high prices private refiners paid for crude oil from their overseas affiliates and the prices they charged for imported products. Moscow's offer of cheap crude oil and products brought this dispute to a head in 1960, when the government appointed the Damle Committee to look into oil pricing. The Committee considered crude oil supplies for the Indian refineries, product prices, and allowable expenses for marketing and distributing products in India. The Committee found that prices and expenses were higher than justified in view of the decline in world crude oil prices following the Suez Canal reopening in 1957. It recommended that Indian refiners buy from the lowest price supplier -- that is, the USSR -- or force their own suppliers to cut prices accordingly.

The private refiners refused to accept Soviet crude oil or to handle Soviet products on the grounds that the Soviet oil was "politically motivated" and constituted an "unreliable" supply. Although cries for nationalization of the private companies were strong, the government did not force the companies to comply. Very soon thereafter, however, the private companies volunteered to discount prices to meet the delivered prices offered by the Soviets. As world prices, and Soviet prices, continued to fall in the early 1960s without further significant reductions by the private refiners, a second Committee was appointed in 1964. Almost immediately the companies cut prices, implying they were designed to deflect pressures to handle Soviet oil. The second committee report belatedly recommended that the government obtain further price reductions by reducing the foreign exchange allowed for crude oil imports.

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New Delhi has continued to pressure the companies to reduce prices by withholding foreign exchange. During the first half of 1969, the private companies were importing Iranian and Saudi Arabian crude oil at \$1.38 per barrel, f.o.b. oil ports. India, arguing that \$1.38 was actually 10 cents above the existing world market price, cut foreign exchange allocations for crude oil imports 7.5% effective 1 June 1969. The companies, initially not willing to reduce prices, were forced to reduce their crude oil runs. By year's end, however, Burmah Shell had agreed to \$1.28, and early in 1970 ESSO and Caltex also agreed. The decline in private refinery throughput during 1969, as indicated in Appendix Table A-2, was the direct result of this dispute.

As of December 1970, however, as a result of price increases for crude oil in the Middle East, the companies requested permission to increase the price they could pay for crude oil imports. When the Indian government did not respond, the refineries cut back their crude oil runs to the volume they could buy with the foreign exchange available. With the public refineries already running at maximum capacity, either more products will have to be imported or consumption will have to be reduced.

II. Problems of Exploration and Production

Despite an accelerated program in recent years by the Oil and Natural Gas Commission (ONGC), which is responsible for India's crude oil production, very few oil wells have been drilled and crude oil production has lagged. At the end of 1969, India had only about 1,000 operating oil wells, 83 gas wells, and 80 wells under test. In total, only some 2,000 wells have been drilled in India since the beginning of oil exploration (see Table A-3). Thus India's petroleum potential is relatively unexplored and a far greater number of wells will have to be drilled before any definitive assessment can be made. Moreover, most wells have been drilled to explore and develop currently producing fields; 720 wells have been drilled in Gujarat and Assam and only 31 in other states. After the Ankleshwar field in Gujarat was discovered, New Delhi estimated that total crude oil

production would reach 320,000 b/d by 1966. Production had not reached even half this level by 1969. Production in Gujarat has been only about equal to Assam's (see Table 4).

Insufficient funds, poor equipment, and lack of technical knowledge have been major problems. During the Second Five-Year Plan (1956-60) the government spent about Rs 260 million (\$55 million) on exploration, and during the Third Plan (1961-65) about Rs 1,150 million (\$242 million) were allocated for exploration and production, but expenditures most likely did not reach this level as there was a shortfall in the overall plan. Actually Soviet and Romanian assistance accounted for a substantial share of public expenditures during both plans. The USSR provided an estimated \$205 million and Romania \$1 million in credits beginning in 1956 for equipment and technical assistance. India is currently drawing on the second \$100 million of this credit. During the Fourth Five-Year Plan (1969-73) New Delhi plans larger rupee expenditures (Rs 1,810 million) than during the Third Plan, but, because of inflation, expenditures will be less in real terms.*

Indian dependence on Soviet equipment and technical aid has slowed exploration and drilling. Soviet exploration techniques are at least ten years behind those of the West, especially for seismic surveys. Also, Soviet turbo-drilling equipment generally is not suited to the soft rock and considerable depths that are typical of India's sedimentary basins. The Indians complain that Soviet equipment is old and prone to breakdown. With its 53 drilling rigs in 1969, the ONGC averaged a mere 34 feet per drill per day, about one-tenth of US experience under similar conditions. Because of Soviet equipment limitations, most Indian wells are drilled to only about 5,000 feet. The ONGC has several Western rigs for drilling deeper wells, but these also are obsolete and lack spare parts. To help train Indian technicians and improve research, India received a grant of about \$1 million from the United Nations Development Program in the early 1960s as well as

* India's currency devaluation in 1966 also increased the cost of imported equipment.

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other assistance from France and Italy, but experienced personnel are still in short supply.

These problems could have been mitigated by private foreign investment in Indian exploration efforts, but foreign partners have been discouraged. The terms demanded by India would be stiff even in a really promising place such as the Persian Gulf: the government insists that a foreign company bear all risks and advance all expenditures; in case of commercial discovery the government will reimburse 51% of outlay and acquire a majority interest. The tax take is 80% (versus 55% in the Persian Gulf states and many other nations) and the partner gets only his share of the profits, with no entitlement to oil unless to supply a local refinery, and even that is subject to negotiation. No new companies have consented to come in on this basis.

The long-established Burmah Oil Company has operated successfully with the government as equal partner in Oil India Limited since 1959. In its three Assam fields the company has drilled about 285 wells, of which 216 are oil producers and 12 gas producers, and production has increased from 1,500 b/d in 1955 to 61,000 b/d in 1969, nearly half of India's total crude oil output. The company expects to expand output in its present fields. The company has also completed 13 exploratory wells in another leased area in Upper Assam. One well, Kusijan No. 2 at Dum Duma, was field tested in 1969 and is reported to be capable of producing 440 b/d, but tests were continuing. The company also is drilling about 14 developmental wells in the old Assam Oil Company concession, which it manages, and is hoping to arrest that company's long-run decline in output.*

* The only other private company that has searched for oil in India was Standard-Vacuum Oil Co. in the late 1950s. The project was initiated in 1953 to explore about 10,000 square miles in West Bengal. The government spent \$3.5 million on the project, contributing 25% of the cost while Stanvac provided 75%. Results of the exploration were disappointing and the project was abandoned in 1960.

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III. Current Activity Onshore and Offshore

The ONGC has been drilling recently in a number of widely separated onshore areas (see the map, Figure 1). Prospects of significant commercial production in any of them are undetermined but probably dim. In the Gujarat basin, tests are under way in four small fields near the present producing area, in three new locations in the Kutch region, and drilling has just begun at Wataman, 40 miles north of Ahmadabad. All the new Gujarat fields are small, but more should be found. In the far north, India's deepest well was begun in March 1970 at Suruin, 25 miles southeast of Jammu in the state of Jammu and Kashmir. However, in September 1970 drilling ceased at 2,400 feet because of loss of equipment in the hole. This area is reported to have good possibilities for oil and gas occurrences at about 20,000 feet. ONGC is also drilling in the Madras and Godavari basins in South India. In Assam (including the Northeast Frontier Area), ONGC is drilling on two fields near Oil India's producing fields; these two have been producing on a test basis for some time, but the potential for sustained production is not clear. Also in the northeast, ONGC has a discovery at Galeki and has begun drilling in the Garo Hills district of Meghalaya State. The intention is to drill soon in Tripura, but if oil is found in this remote area of Assam behind East Pakistan, its transportation to markets would be a major problem. In general, exploration in Assam is very expensive owing to its remoteness, the hilly jungle terrain, and the depth of the wells.

ONGC drilling on its first offshore well in shallow water finally got under way in 1970 but ran into difficulty. With Soviet assistance, a fixed platform* was assembled about 6 miles west of Aliabet Island in the Gulf of Cambay off the Gujarat coast. The platform is about 108 feet high, more than sufficient to cope with the area's normal 32-foot tide and a maximum water depth at high tide of 85 feet. Because of technical

* Fixed platforms for drilling are much less efficient than floating platforms.

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difficulties, drilling reached only about 450 feet before it was suspended for the monsoon season in June. Drilling resumed in December 1970, and the ONGC is optimistically hoping to drill to 6,000 feet by March 1971.*

Government policy on foreign participation in offshore oil exploration has contributed to significant delays in drilling in a very promising deep-water area known as the Bombay High in the Gulf of Cambay. Located about 45 miles northwest of Bombay, the Bombay High was one of several areas revealed by Indo-Soviet offshore seismographic teams in a 1965-66 survey, and showed excellent promise of becoming a major offshore oil discovery by world standards. The structure compares in size to the largest of the proved Persian Gulf offshore areas and is at least 20 times the size of India's proved Ankleshwar field in Gujarat. However, the water depth exceeds the capability of present Soviet and Indian equipment, and the government has been reluctant to allow other foreign participation.

New Delhi insists that offshore exploration will be conducted on an "owner-assisted basis only" (for example, a drilling platform owned and operated by ONGC with foreign financial and technical assistance when required). Soviet specialists declined India's 1967 request for assistance in deep-water drilling, admitting to a lack of know-how. Subsequently, seven Western companies have bid for participation, but India has delayed in responding while considering policy implications of each offer. In December 1970, India announced it had accepted an offer from the Japanese Mitsubishi Co. (which teamed up with the

* According to a report received in March 1971, drilling was terminated at about 4,900 feet in February, when the sands showed traces of gas and oil but the structure proved to be too thin for consideration as a possible producing field. ONGC geologists claimed that oil-bearing structures probably exist at this site below 15,000 feet but Soviet drills being used are incapable of exploring to this depth. The equipment at the Alibet site is to be dismantled and moved to other drilling sites in the Gulf of Cambay.

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Offshore Company of the United States) for a drilling platform and technical help costing \$14.5 million. The Japanese government will give a yen credit of \$10 million for the project. Prospects for drilling in the Bombay High are still indefinite, however, as India reportedly hopes to get Mitsubishi to reduce its price by as much as 30% to 40%, and Mitsubishi, in any event, will require two years to build the platform if a contract is negotiated.

The ONGC has one-sixth interest in an Indo-Iranian-Italian-American concession in the Persian Gulf, which began producing in September 1969. India has had some difficulty in disposing of its share of production because it is low-quality oil and is not suited to the present Indian refineries. During 1970, however, New Delhi concluded an agreement with the French government-owned Compagnie Francaise des Petroles to take 1 million tons annually (price unspecified), and other sales are under discussion. India also is considering modifying an existing refinery or constructing a new one in Goa to process this crude oil.

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Table A-1

**India: Consumption, Imports, and Exports
of Selected Petroleum Products
1969**

<u>Product</u>	<u>Thousand Barrels</u>		
	<u>Consumption</u>	<u>Imports</u>	<u>Exports</u>
Aviation gasoline	560	359	--
Kerosine	24,520	4,658	--
Jet fuel	5,075		
Diesel	61,830	--	511
Furnace and fuel oils		816	54
Lubricating oils and greases	3,965	2,590	--
Motor gasoline	11,940	--	5,691
Naphtha	6,255	--	

Table A-2

**India: Refinery Throughput
by Private and Public Sector**

<u>Thousand Barrels per Day</u>			
<u>Year</u>	<u>Private</u>	<u>Public</u>	<u>Total</u>
1963	154.7	9.3	164.0
1964	161.3	17.4	178.7
1965	168.6	29.7	198.2
1966	177.9	69.3	247.2
1967	163.0	134.3	297.3
1968	169.2	160.5	329.7
1969	161.4	198.4	359.8

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Table A-3

Status of Wells Drilled in India
as of 31 December 1969

<u>Location</u>	<u>Oil</u>	<u>Gas</u>	<u>Dry</u>	<u>Under Test</u>	<u>Injection</u>	<u>Temporarily Abandoned</u>	<u>Number</u>
<u>Assam</u>							
Assam Oil Company	373	8	263	a/	--	8	335
Oil India, Ltd.	216	12	28	22	7	--	285
(50% Burmah Oil)							
Oil and Natural Gas Commission	80	3	38	19	--	--	140
Total	669	23	329	41	15	335	1,412
<u>Gujarat</u>							
Oil and Natural Gas Commission	350	56	117	39	18	--	580
<u>Others</u>							
Oil and Natural Gas Commission	--	4	27	--	--	--	31
Total	1,019	83	473	80	33	335	2,023

a. Abandoned.